

1      **TRANSMISSION DEVICE FOR A TWO DIMENSIONAL IMAGE DISPLAY**  
2      **MODULE TO PROGRAMMABLY DISPLAY AN IMAGE IN THE MODULE**  
3      **BACKGROUND OF THE INVENTION**

4      1. Field of the Invention

5            The present invention relates to a transmission device, and more particularly to  
6      a transmission device for a two dimensional (2D) image display module to display an  
7      image in the 2D image display module.

8      2. Description of Related Art

9            With reference to Figs. 6 and 7, a conventional two dimensional (2D) image  
10     display module has a pattern (20) movably sandwiched between a substrate (10) and a  
11     lens (30). A transmission device (40) having a cam (41) rotatably mounted on the  
12     backboard plate (30) and two arms (42) pivotally connected to the lens (30). Distal ends  
13     of each of the two arms (42) are connected to the cam (41) such that when the cam (41)  
14     is rotated, the two arms (42) are able to pivot relative to the lens (30). Because the other  
15     distal ends of the two arms (42) are engaged with the pattern (20), when the two arms  
16     (42) are pivoted, the pattern (20) is moved upward and downward repeatedly. The  
17     pattern (20) is thus able to present different pictures backboarッド on the angle selected  
18     via the lens (30).

19           It is noted from the conventional transmission device (40) that after the two  
20     arms (42) are pivoted, the pattern (20) falls back to its original position by gravity. When  
21     the humidity in the air becomes dense, the movement of the pattern (20) becomes  
22     sluggish and sometimes may not maintain in its original space, which results in that the  
23     observer can not have a very clear image in that the image presenting angle between the  
24     pattern (20) and the lens (30) is mis-aligned.

25           Still further, after the pattern (20) is first inserted between the lens (30) and the

1 substrate (10), calibration of the image presenting angle between the pattern (20) and the  
2 lens (30) has to be done manually. That is, the operator has to move around the pattern  
3 (20) with the lens (30) fixed or the lens (30) with the pattern (20) moved so as to have  
4 the best image presenting angle, which is quite troublesome and inefficient.

5 To overcome the shortcomings, the present invention intends to provide an  
6 improved transmission device to mitigate or obviate the aforementioned problems.

7 **SUMMARY OF THE INVENTION**

8 The primary objective of the invention is to provide an improved transmission  
9 device for a 2D image display module. The transmission device is securely mounted on  
10 a substrate to drive either the backboard or the lens of the 2D image display module to  
11 move in a desired direction such that the image is able to be presented in a desired  
12 manner.

13 To accomplish the foregoing objective, the transmission device of the present  
14 invention includes a step motor securely mounted on the center of the box, securing rods  
15 each extending from the bottom face of the box and out of the backboard and the lens.  
16 To correspond to the securing rods, the backboard has first elongated holes defined in  
17 opposite sides of the backboard and the lens has second elongated holes defined in  
18 opposite sides of the lens. Each of the first elongated hole corresponds to and  
19 communicates with one of the second elongated holes such that the securing rods are  
20 able to extend through the backboard and the lens. Each of the first elongated holes has a  
21 dimension smaller than that of each of the second elongated holes.

22 Other objects, advantages and novel features of the invention will become more  
23 apparent from the following detailed description when taken in conjunction with the  
24 accompanying drawings.

25 **BRIEF DESCRIPTION OF THE DRAWINGS**

1           Fig. 1 is a perspective view of the transmission device of the present invention;  
2  
3           Fig. 2 is a side view in cross section showing the relative position between the  
4           transmission device and the backboard at its first position when the transmission device  
5           is driving the backboard;

6           Fig. 3 is top plan view showing the relative position between the backboard and  
7           the lens when the backboard is driven by the transmission device of the present  
8           invention;

9           Figs. 4 is a schematic view in cross section showing the relative position  
10          between the transmission device of the present invention and the backboard after the  
11          backboard is driven to move to a second position; and

12          Fig. 5 is a schematic top plan view showing that the backboard is moved to its  
13          second position relative to the lens.

14          DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

15          With reference to Fig. 1, a two dimensional (2D) image display module is  
16          composed of a box (50) with a top opening, a lens (70) and a backboard (60) sandwiched  
17          between the lens (70) and a bottom face defining the top opening of the box (50). A  
18          pattern (not shown) is normally attached to a top side of the backboard (60) to face the  
19          lens (70). The transmission device in accordance with the present invention has a  
20          securing member (1) and a programmable step motor (2).

21          With reference to Fig. 2 and still taking Fig. 1 for reference, the securing  
22          member (1) has securing rods (11) each extending from the bottom face of the box (50)  
23          and out of the backboard (60) and the lens (70). To correspond to the securing rods (11),  
24          the backboard (60) has first elongated holes (61) defined in opposite sides of the  
25          backboard (60) and the lens (70) has second elongated holes (71) defined in opposite  
              sides of the lens (70). Each of the first elongated hole (61) corresponds to and

1     communicates with one of the second elongated holes (71) such that the securing rods  
2     (11) are able to extend through the backboard (60) and the lens (70). Each of the first  
3     elongated holes (61) has a dimension smaller than that of each of the second elongated  
4     holes (71).

5                 The programmable step motor (20) has a driving rod (21) eccentrically formed  
6     on a disk (22) which is securely formed with the motor shaft (23). The driving rod (21)  
7     extends into a long hole (62) in the backboard (60) and a hole (72) in the lens (70),  
8     which is shown in Fig. 3.

9                 With reference to Figs. 4, 5 and taking Fig. 2 for comparison, it is noted that  
10    when the programmable step motor (2) is activated and thus the driving rod (21) is  
11    driven to rotate by the disk (22) to move from a first position to a second position, the  
12    driving rod (21) is able to freely move in the hole (72) of the lens (70). However,  
13    because of the limitation of the long hole (62) in the backboard (60), the rotational  
14    movement of the eccentrically formed driving rod (21) will thus drive the backboard (60)  
15    to move relative to the lens (70) from its first position to the second position. That is to  
16    say, the backboard (60) is able to move up and down with respect to the lens (70) due to  
17    the limitation of the long hole (62) in the backboard (60).

18                 Because the movement of the backboard (60) in respect to the lens (70), the  
19    picture (or pattern) sandwiched between the backboard (60) and the lens (70) is able to  
20    present itself in a pre-programmed manner. That is, the picture may contain several  
21    different images arranged in different positions in the picture. When the backboard (60)  
22    is driven to move in different manners as a result of the program chosen from the  
23    programmable step motor (2), the images may be presented in continuous sequence, in  
24    alternate sequence, forwardly, backwardly...etc..

25                 In summary, due to the transmission structure of the present invention, the

1 images in the picture are able to be presented via the 2D image display module in  
2 different manners.

3 Even though numerous characteristics and advantages of the present invention  
4 have been set forth in the foregoing description, together with details of the structure and  
5 function of the invention, the disclosure is illustrative only, and changes may be made in  
6 detail, especially in matters of shape, size, and arrangement of parts within the  
7 principles of the invention to the full extent indicated by the broad general meaning of  
8 the terms in which the appended claims are expressed.